

FI *Sub 25*
a closure proximate the end of the generally tubular body;
an unactuated trigger that retains the closure to occlude the outlet; and
a deflector being coupled with the tubular body and spaced axially away from the outlet,
the deflector including a face portion oriented generally perpendicular with respect to the axis
and a canopy portion oriented generally parallel to the axis, the canopy portion having a
generally flat surface disposed on a plane.

26. (New) The sprinkler of claim 25, further including two frame arms being coupled to the generally tubular body and the deflector proximate the outlet, the two frame arms being located on a plane parallel to an area to be protected, the plane intersecting the axis.

27. (New) The sprinkler of claim 25, further including only two support arms coupling the flat canopy and the face portion of the deflector.

28. (New) The sprinkler of claim 25, further including only two support arms coupling the flat canopy and the face portion of the deflector, the two support arms defining a single flow opening through the deflector.

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29. (New) The sprinkler of claim 25, further including only two support arms coupling the flat canopy and the face portion of the deflector, the two support arms being spaced apart by at least 1.5 inches.

30. (New) The sprinkler of any one of claims 25-29, wherein the deflector transforms water flow fed into the inlet and being discharged horizontally from the outlet, upon release of the closure by the trigger, over an extended-coverage area on one side of the tubular body in an amount and with a distribution effective to control a fire in the extended-coverage area.

Sub 2510
31. (New) The sprinkler of claim 30, wherein the plane is oriented in at least one orientation, which is parallel to or oblique to the axis.

32. (New) The sprinkler of claim 30, wherein the amount of water being discharged is at a density of at least 0.15 gallons per minute per square feet.

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33. (New) The sprinkler of claim 32, wherein the amount of water being discharged is at a density of 0.20 gallons per minute per square feet or greater

34. (New) The sprinkler of claim 33, wherein the extended-coverage area is greater than 100 square feet.

35. (New) The sprinkler of claim 33, wherein the water flow from the outlet is at least 38 gallons per minute.

36. (New) The sprinkler of claim 33, wherein the extended-coverage area including a length and a width, each of the length and the width being greater than 10 feet.

37. (New) The sprinkler of claim 36, wherein the extended coverage including a length and a width, each of the length and the width being at least 16 feet such that the extended-coverage area is at least 256 square feet.

38. (New) The sprinkler of claim 37, wherein the extended-coverage area is at least 320 square feet.

39. (New) The sprinkler of claim 33, wherein the K factor is about 11 or greater.

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40. (New) The sprinkler of claim 39, wherein the K factor is about 14 or greater.

41. (New) The horizontal sprinkler of claim 31, wherein the canopy portion including a generally rectangular shaped perimeter having a length along the axis of about 1.1 inches or more and a width orthogonal to the axis of about 1.5 inches or more.

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42. (New) An extended coverage, horizontal sidewall automatic fire sprinkler comprising:
a generally tubular body with a passageway disposed along an axis, one end of the passageway forming an outlet at one end of the tubular body, the tubular body having a K factor greater than 9, where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge;

a closure positioned proximate the outlet so as to occlude the passageway;

an unactuated trigger that retains the closure at the outlet; and

a deflector being coupled to the tubular body and spaced from the outlet, the deflector transforming water being discharged horizontally from the outlet, upon release of the closure by actuation of the trigger, at a density of at least 0.15 gallons per minute per square feet, the deflector having a face portion generally orthogonal to the axis and a canopy portion being coupled to the face portion at a first canopy end and extending generally along the axis to a second canopy end, the first canopy end being spaced at a first distance from the outlet, the second canopy end being spaced from the outlet at a second distance greater than the first distance.

43. (New) The sprinkler of claim 42, wherein the deflector transforms water being discharged from the outlet so as to provide a density of 0.20 gallons per minute per square feet or greater.

44. (New) The sprinkler of claim 43, wherein the deflector transforms water being discharged from the outlet at a rate of at least 38 gallons per minute.

45. (New) An extended coverage, horizontal sidewall automatic fire sprinkler comprising:

Sub 12 a generally tubular body defining a passageway along an axis and forming an outlet at an end of the generally tubular body, the passageway having a K factor greater than 9, where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge;

FI at least one frame arm being coupled to the end of the generally tubular body, the at least one frame arm being located generally on a horizontal plane, which is generally parallel to an area to be protected;

a closure proximate the end of the generally tubular body;

an unactuated heat responsive trigger that retains the closure to occlude the passageway;

and

a deflector assembly being coupled to the generally tubular body by the at least one frame arm and spaced from the outlet along the axis so that when the heat responsive trigger is actuated, the closure is positioned to allow a flow of fluid to issue horizontally from the outlet of the generally tubular body over an extended-coverage area.

46. (New) An extended coverage, horizontal sidewall automatic fire sprinkler comprising:

a generally tubular body defining a passageway along an axis and forming an outlet at an end of the generally tubular body, the passageway having a K factor greater than 9, where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge;

at least one frame arm being coupled to the end of the generally tubular body, the at least one frame arm being located generally on a vertical plane, which is generally perpendicular to an area to be protected;

a closure proximate the end of the generally tubular body;

an unactuated heat responsive trigger that retains the closure to occlude the passageway;

and

Sub 27 a deflector assembly being coupled to the generally tubular body by the at least one frame arm and spaced from the outlet along the axis so that when the heat responsive trigger is actuated the closure is positioned to allow a flow of fluid to issue horizontally from the outlet of the generally tubular body over an extended-coverage area, the deflector having a face portion extending generally orthogonal to the axis and a canopy portion being coupled to the face portion by only two support arms.

F1 47. (New) An extended coverage, horizontal sidewall automatic fire sprinkler comprising:

a generally tubular body defining a passageway along an axis, the passageway having a K factor greater than 9 where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge;

a closure proximate the end of the generally tubular body;

an unactuated heat responsive trigger that retains the closure to occlude the passageway;

and

a deflector being coupled to the tubular body and spaced from the outlet, the deflector transforming water being discharged horizontally from the outlet, upon release of the closure by actuation of the trigger, over a generally horizontal extended coverage area so as to control a fire in the coverage area, the deflector having a face portion extending generally orthogonal to the axis and a canopy portion being coupled to the face portion by only two support arms defining a single opening therebetween.

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48. (New) An extended coverage, horizontal sidewall automatic fire sprinkler comprising:

a generally tubular body defining a passageway along an axis, the passageway having a K factor greater than 9, where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge;

a closure proximate the outlet;

an unactuated heat responsive trigger that retains the closure to occlude the passageway;

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and

a deflector being coupled to the tubular body and spaced from the outlet, the deflector transforming water being discharged horizontally from the outlet, upon release of the closure by actuation of the trigger, over a generally horizontal extended coverage area so as to control a fire in the coverage area, the deflector having a face portion extending generally orthogonal to the axis and a canopy portion, the canopy portion being coupled to the face portion by only two support arms symmetrical to the axis, the two support arms defining a single opening having a distance of at least 1.5 inches between proximal surfaces of each support arm.

49. (New) The sprinkler according to any one of claims 45-48, wherein the deflector transforms water at a rate of at least 38 gallons per minute discharged horizontally from the outlet at a density of at least 0.15 gallons per minute per square feet over the extended coverage area.

50. (New) A fire protection system for a structure, the structure having an area to be protected, the area being disposed generally on a first plane and at least one wall disposed generally on a second plane, which is generally perpendicular to the first plane, the system comprising:

at least one pipe in communication with a fluid supply; and

at least one sprinkler being coupled to the at least one pipe and projecting from the at least one wall toward a boundary of the area to be protected, the at least one sprinkler including:

Sub 12 a generally tubular body with a passageway disposed along an axis, one end of the passageway forming an outlet at one end of the tubular body, the tubular body having a K factor greater than 9, where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge; and

F1 a deflector being coupled to the tubular body and spaced from the outlet, the deflector deflects water being discharged through the outlet after activation of the sprinkler substantially uniformly over the area to be protected, the deflector having a face portion oriented generally perpendicularly with respect to the axis and a canopy portion oriented generally parallel to the axis, the canopy portion having a generally flat planar surface.

51. (New) The system according to claim 50, wherein the structure including a ceiling disposed generally on a third plane parallel to the first plane, and the at least one sprinkler including two sprinklers mounted on the at least one wall and spaced apart from the axis of the body by a distance of at least approximately 10 feet, the canopy portion of each deflector of the sprinklers being spaced at least about 4.5 inches from the ceiling, and the face portion of the deflector being spaced at least about 4 inches from a surface of the wall.

52. (New) The system according to claim 50, wherein the body further including at least one frame arm being coupled to the generally tubular body and the deflector so that the at least one frame arm is spaced from the outlet along the axis, the at least one frame arm being located on a horizontal plane, which is generally parallel to the first plane and intersecting the axis.

53. (New) The system according to claim 50, wherein the canopy portion further including a portion being coupled to the face portion by only two support arms defining a single opening therebetween.

54. (New) The system according to claim 50, wherein the deflector transforms water being discharged from the outlet at a rate of at least 38 gallons per minute, upon release of a closure which occludes the passageway until actuation of a trigger, at a density of at least 0.15 gallons per minute per square feet over the area to be protected.

55. (New) A fire protection system for an area to be protected, the area being disposed generally on a first plane, the system comprising:

FI means for distributing fluid upon actuation of a heat responsive trigger at a flow rate of at least 38 gallons per minute from a sprinkler with a K-factor greater than 9, and at density of at least 0.15 gallons per minute per square feet over the area to be protected; and

at least one pipe being located above a boundary of the area to be protected, the pipe being in communication with a fluid supply.

56. (New) The system of claim 55, wherein the flow rate including a flow rate of 48 gallons per minute or greater at a density of 0.20 gallons per minute per square feet over the area to be protected.

57. (New) A fire protection method, comprising:

locating a generally tubular body proximate a fluid deflecting structure, the body having an inlet, a passageway and an outlet, the inlet being fed with water at a flow rate in gallons per minute divided by a square root of the water pressure fed to the inlet in pounds per square inch gauge for a magnitude thereof at generally greater than 9, the fluid deflecting structure being located next to and above an area to be protected, the area having a length and a width, each of the length and the width being greater than 10 feet; and

providing a water supply to the fluid deflecting structure so that at least 38 gallons per minute are dispersed over the area to be protected at a density of at least 0.15 gallons per minute per square feet.

58. (New) The method of claim 57, wherein the providing includes supplying water so that 48 gallons per minute or greater are dispersed over the area to be protected at a density of 0.20 gallons per minute per square feet or greater.

59. (New) A method of providing fire protection for an area to be protected, the method comprising:

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 locating a sprinkler with at least a K factor of 9 adjacent the boundary of an area greater than 100 square feet, where the K factor represents a flow of fluid in gallons per minute through the sprinkler divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge; and

 providing a water supply to the sprinkler, so that when the sprinkler is actuated, water is distributed over the area at a density of at least 0.15 gallons per minute per square feet.

60. (New) The method of claim 59, wherein the providing further includes supplying water at a flow rate of 48 gallons per minute to be distributed over the area to be protected of about 256 square feet or greater.

61. (New) The method of claim 60, wherein the providing includes supplying water to be distributed at a density of 0.20 gallons per minute per square feet over the area to be protected of about 320 square feet or greater.
